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Jin-Woo Park et al.

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For: DOUBLE-SIDED LIGHT EMITTING DEVICE

SUBMISSION OF VERIFIED TRANSLATION OF PRIORITY DOCUMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicants submit herewith a translation of Korean Patent Application Nos. 2003-34179 and 2003-86116 claiming priority to May 28, 2003 and November 29, 2003 respectively, and statements from the translator.

If there are any fees associated with filing of this Submission, please charge the same to our Deposit Account No. 503333.

Respectfully submitted,

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Date: 1/18/08

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VERIFICATION OF TRANSLATION

I, Seung-Hee LEE, of Suite 1810, Hwanghwa Bldg., 832-7, Yeoksam-dong, Gangnam-gu, Seoul, Republic of Korea hereby declare that I am knowledgeable in the English and Korean languages, and that to the best of my knowledge the attached document is a true and complete English translation of the Korean Patent Application Nos. 10-2003-0034179 and 10-2003-0086116.

Dated January 18, 2008

이승희

Signature

Translation of Priority Document

THE KOREAN INTELLECTUAL PROPERTY OFFICE

This is to certify that annexed hereto is a true copy from the r ecords of the Korean Intellectual property Office of the following a pplication as filed

Application Number : Korean Patent Application No. 10-2003-0034179

Date of Application : May 28, 2003

Applicant(s) : Samsung SDI Co., LTD.

August 6, 2003

COMMISSIONER

[ABSTRACT]

[Abstract of the Disclosure]

The present invention relates to an organic electro-luminescence light emitting display device capable of displaying both sides by installing polarizing plates over and below a displaying device so that their polarization axes are perpendicular to each other. The organic electro-luminescence light emitting display device comprises an anode electrode formed on a lower insulating substrate, an organic electro light emitting layer formed on the anode electrode, a cathode electrode formed on the organic electro light emitting layer; and an upper insulating substrate for encapsulating the anode electrode, the an organic electro light emitting layer and the cathode electrode, wherein polarizing elements are coated on a side surface of the upper insulating substrate and a side surface of the lower insulating substrate, respectively..

[SPECIFICATION]

[Title of the Invention]

ORGANIC ELECTRO-LUMINESCENE LIGHT EMITTING DISPLAY DEVICE

[Brief Description of the Drawings]

FIGS. 1 through 4 show cross-sectional structures of an organic electro-luminescence light emitting display device having a polarizing element according to the invention;

FIGS. 5 through 8 show cross-sectional structures of an organic electro-luminescence light emitting display device having a polarizing plate according to the invention.

[Detailed Description of the invention]

[Object of the Invention]

[Technical field of the invention and Related Art prior to the Invention]

The present invention relates to an organic electro-luminescence light emitting display device and, more particularly, to an organic electro-luminescence light emitting display device capable of displaying both sides by installing polarizing plates over and below a displaying device so that their polarization axes are perpendicular to each other,.

The conventional organic electro-luminescence light emitting display devices are subjected to considerable decrease in contrast according to intensity of external light. To prevent this phenomenon, for example a black matrix (BM) for blocking external light has been used. In spite of using such a black matrix, it is very difficult to completely block the external light on an emission region to make a black state.

In order to solve such a problem, a method of blocking external light using a circular-polarizing plate has been used. The circular-polarizing plate consists of a linear-polarizing plate and a λ/4 compensating plate. In the circular-polarizing plate, an angle between two axes of the λ/4 compensating plate and the liner-polarizing plate becomes 45 degrees. External light is polarized about 45 degrees to the axes of the λ/4 compensating plate after passing through the liner-polarizing plate. When the external light polarized passes through the λ/4 compensating plate, a vibration position of the external light does spiral movement. When the external light polarized is reflected on a reflective plate of a display device, a position of its rotation is reversed, and the rotation is stopped after passing the λ/4 compensating plate, so that the external light becomes linear-polarized light that makes 90 degrees to an original polarized surface. Accordingly, the external light is absorbed and blocked through the linear-polarizing plate. Meanwhile, an organic electro-luminescence light emitting display device using a circular-polarizing plate for implementing the method above is disclosed in US Patent No. 5,596,246. The organic electro-luminescence light emitting display device comprises a reflective layer, a first insulating layer, a light emitting layer, a second insulating layer, a transparent electrode, a glass substrate, a circular-polarizing plate and so forth. However, the organic electro-luminescence light emitting display device has a problem in that it must have a separate reflective plate. Further, the manufacturing cost of the organic electro-luminescence light emitting display device increases due to the λ/4 compensating plate of the circular-polarizing plate.

[Technical Goal of the Invention]

It is, therefore, an objective of the present invention to provide an organic electro-luminescence light emitting display device, capable of displaying both sides and blocking external light by configuring polarizing plates over and below a displaying device so that their polarization axes are perpendicular to each other,.

In order to accomplish these objective, according to one aspect of the present invention, there is provided an organic electro-luminescence light emitting display device comprising an anode electrode formed on a lower insulating substrate, an organic electro light emitting layer formed on the anode electrode, a cathode electrode formed on the organic electro light emitting layer; and an upper insulating substrate for encapsulating the anode electrode, the an organic electro light emitting layer and the cathode electrode, wherein polarizing elements are coated on a side surface of the upper insulating substrate and a side surface of the lower insulating substrate, respectively.

The lower and upper layers of polarizing material are coating layers coated on the outer surfaces of the lower and upper substrates respectively, or coating layers coated on the inner surfaces of the lower and upper substrates respectively. The upper layer of polarizing material is a coating layer coated on the inner surface of the upper substrate, and the lower layer of polarizing material is a coating layer coated on the outer surface of the lower substrate, and otherwise, the upper layer of polarizing material is a coating layer coated on the outer surface of the upper substrate, and the lower layer of polarizing material is a coating layer coated on the inner surface of the lower substrate. Furthermore, the lower and upper layers of polarizing material are disposed so that their polarization axes are perpendicular to each other, and each are

a coating layer having a thickness from about 0.1μm to 50.0μm.

According to another aspect of the present invention, there is provided an organic electro-luminescence light emitting display device, which comprises an anode electrode formed on a lower insulating substrate, an organic electro light emitting layer formed on the anode electrode, a cathode electrode formed on the organic electro light emitting layer, an upper insulating substrate for encapsulating the anode electrode, the an organic electro light emitting layer and the cathode electrode, and two polarizing elements arranged on one side surface of the upper insulating substrate and on one side surface of the lower insulating substrate.

The lower and upper polarizing plates are polarizing films bonded on the inner surfaces of the lower and upper substrates respectively. The upper polarizing plate may be a polarizing film bonded on the inner surface of the upper substrate, and the lower polarizing plate may be a polarizing film bonded on the outer surface of the lower substrate. Further, the upper polarizing plate may be a polarizing film bonded on the outer surface of the upper substrate, and the lower polarizing plate may be a polarizing film bonded on the inner surface of the lower substrate. Otherwise, the lower and upper polarizing plates are polarizing films bonded on the outer surfaces of the lower and upper substrates, respectively. Further, the lower and upper polarizing plates are disposed so that their polarization axes are perpendicular to each other, and each are a polarizing film having a thickness from about 50μm to 300μm.

[Structure and Operation of the Invention]

The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This

invention may, however, be embodied in different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. In the drawings, the lengths, the thickness, etc. of layers and regions are exaggerated for clarity. Like numbers refer to like elements throughout the specification.

(Exemplary Embodiment 1)

FIGS. 1A and 1B show an organic electro-luminescence light emitting display device according to a first embodiment of the invention. The organic electro-luminescence light emitting display device according to a first embodiment of the invention has a structure coated with polarizing elements on external side surfaces of both a glass substrate and an encapsulating substrate, respectively.

Referring to FIGS. 1A and 1B, there is a glass substrate as a transparent lower insulating substrate 110, on which a transparent anode electrode 120 is formed. The transparent anode electrode 120 is formed by depositing and patterning transparent conductive material of ITO (Indium Tin Oxide), IZO (Indium Zinc Oxide) or so forth on an inner surface of the lower insulating substrate 110.

Next, an organic electro light-emitting layer 130 is formed on the transparent anode electrode 120. The organic electro light-emitting layer 130 is formed between the transparent anode electrode 120 and a cathode electrode to be formed thereafter, and has a multi-layered structure that includes at least one of a hole injecting layer (HIL), a hole transporting layer (HTL), an emitting layer, an electron transporting layer (ETL) and an electron injecting layer

(EIL).

Next, a penetrating cathode electrode 140 is formed on the organic electro light-emitting layer 130. It is preferable that the penetrating cathode electrode 140 is formed of a metal layer of Ca, etc. which has a low work function.

After forming the penetrating cathode electrode 140, a transparent protection layer 150 is formed by using a transparent encapsulat material. The transparent protection layer 150 not only guarantees a life time of the organic electro-luminescence light emitting display device exposed in the air but also prevent oxidation of the penetrating cathode electrode 140 or the transparent anode electrode 120. Next, the transparent anode electrode 120, the organic electro light-emitting layer 130 and the penetrating cathode electrode 140 are encapsulated on the transparent protection layer 150 by using a encapsulat glass using as an upper insulating substrate 160.

After encapsulating by using the upper insulating substrate 160, polarizing elements 170 and 175 are formed on outer side surfaces of the transparent upper and lower insulating substrates 160 and 110 by coating polarized materials, respectively.

Here, it is preferable that the polarizing elements 170 and 175 are formed by coating a polarizing solution available from Optiva Inc. at a thickness from about $0.1\mu m$ to $50.0\mu m$. Further, it is preferable that the polarizing elements 170 and 175 are formed so that their polarization axes can be perpendicular to each other.

In other words, in the other exemplary embodiment of the invention, the lower and

upper polarizing elements 170 and 175 are formed on the lower and upper insulating substrates 110 and 160 by coating so that their polarization axes may be integrally formed with the lower and upper insulating substrates 110 and 160.

(Exemplary Embodiment 2)

FIG. 2 shows an organic electro-luminescence light emitting display device according to a second embodiment of the invention. The organic electro-luminescence light emitting display device according to the second embodiment has a structure where a lower polarizing element 270 is arranged on an outer surface of a lower insulating substrate 210, and an upper polarizing element 275 is arranged on an inner surface of an upper insulating substrate 260.

Referring to FIG. 2, as in the first embodiment, an anode electrode 220, an organic electro light emitting layer 230, a cathode electrode 240 and a transparent protection layer 250 are sequentially formed on an inner surface of the lower insulating substrate 210.

Next, the polarizing element 270 which is coated with a polarizing material is formed on an outer surface of the lower insulating substrate 210, as in the first exemplary embodiment.

Next, a polarizing element 275 which is coated with a polarizing material is formed on an inner surface of the upper insulating substrate 260. Then, the anode electrode 220, the organic electro light emitting layer 230 and the cathode electrode 240 are encapsulated by using the upper insulating substrate 260.

(Exemplary Embodiment 3)

FIG. 3 shows an organic electro-luminescence light emitting display device according to

a third embodiment of the invention. The organic electro-luminescence light emitting display device according to the third embodiment has a structure where polarizing elements 370 and 375 are coated on an inner surface of an upper and lower insulating substrates 310 and 360, respectively.

Referring to FIG. 3, the polarizing element 370 which is coated with a polarizing material is formed on an inner surface of the lower insulating substrate 310. Then, an anode electrode 320, an organic electro light emitting layer 330, a cathode electrode 340 and a transparent protection layer 350 are sequentially formed on the polarizing element 370.

Next, the polarizing element 375 which is coated with a polarizing material is formed on an inner surface of the upper insulating substrate 360, as in the second exemplary embodiment. Then, the anode electrode 320, the organic electro light emitting layer 330 and the cathode electrode 240 are encapsulated by using the upper insulating substrate 360.

(Exemplary Embodiment 4)

FIG. 4 shows an organic electro-luminescence light emitting display device according to a fourth embodiment of the invention. The organic electro-luminescence light emitting display device according to the fourth embodiment has a structure where polarizing elements 470 and 475 are coated on an inner surface of a lower insulating substrate 410, and on an outer surface of an upper insulating substrate 460, respectively.

Referring to FIG. 4, the polarizing element 470 which is coated with a polarizing material is formed on an inner surface of the lower insulating substrate 410. Then, an anode electrode 420, an organic electro light emitting layer 430, a cathode electrode 440 and a

transparent protection layer 450 are sequentially formed on the polarizing element 470.

Then, the anode electrode 420, the organic electro light emitting layer 430 and the cathode electrode 440 are encapsulated on the transparent protection layer 450 by using the upper insulating substrate 360.

Next, the polarizing element 475 which is coated with a polarizing material is formed on the outer surface of the upper insulating substrate 460.

(Exemplary Embodiment 5)

FIGS. 5A and 5B show an organic electro-luminescence light emitting display device according to a fifth embodiment of the invention. The organic electro-luminescence light emitting display device according to the fifth embodiment has a structure where polarizing elements 570 and 575 are formed on outer surfaces of upper and lower insulating substrates 510 and 560, respectively.

Referring to FIGS. 5A and 5B, an anode electrode 520, an organic electro light emitting layer 530, a cathode electrode 540 and a transparent protection layer 550 are sequentially formed on the lower insulating substrate 510.

Then, the anode electrode 520, the organic electro light emitting layer 530 and the cathode electrode 540 are encapsulated by using the upper insulating substrate 560.

After encapsulating by using the upper insulating substrate 560, the polarizing elements 570 and 575 are formed on the outer surfaces of the upper and lower insulating substrates 510 and 560, respectively.

Here, the polarizing elements 570 and 575 are preferably formed in such a manner that their polarization axes are perpendicular to each other. Further, the polarizing elements 570 and 575 are preferably by bonding a polarizing film between about 50 to 300㎛ in thickness on the upper and lower insulating substrates 560 and 510.

(Exemplary Embodiment 6)

FIG. 6 shows an organic electro-luminescence light emitting display device according to a sixth embodiment of the invention. The organic electro-luminescence light emitting display device according to the sixth embodiment has a structure where polarizing elements 670 and 675 are formed on an outer surface of an lower insulating substrate 610 and an inner surface of an upper insulating substrate 660, respectively.

Referring to FIG. 6, as in the fifth embodiment, an anode electrode 620, an organic electro light emitting layer 630, a cathode electrode 640 and a transparent protection layer 650 are sequentially formed on an inner surface of the lower insulating substrate 610.

A polarizing element 670 is formed on an outer surface of the lower insulating substrate 610, as in the fifth embodiment.

Next, a polarizing element 675 is formed on an inner surface of an upper insulating substrate 660. Then, the anode electrode 620, the organic electro light emitting layer 630 and the cathode electrode 640 are encapsulated by using the upper insulating substrate 660.

(Exemplary Embodiment 7)

FIG. 7 shows an organic electro-luminescence light emitting display device according to

a seventh embodiment of the invention. The organic electro-luminescence light emitting display device according to the seventh embodiment has a structure where polarizing elements 770 and 775 are formed on inner surface of an upper and lower insulating substrates 710 and 760, respectively.

Referring to FIG. 7, a polarizing element 770 is formed on an inner surface of the lower insulating substrate 710. Then, an anode electrode 720, an organic electro light emitting layer 730, a cathode electrode 740 and a transparent protection layer 750 are sequentially formed on the polarizing element 770.

Next, a polarizing element 775 is formed on an inner surface of the upper insulating substrate 610. Then, the anode electrode 720, the organic electro light emitting layer 730 and the cathode electrode 740 are encapsulated by using the upper insulating substrate 760.

(Exemplary Embodiment 8)

FIG. 8 shows an organic electro-luminescence light emitting display device according to an eighth embodiment of the invention. The organic electro-luminescence light emitting display device according to the eighth embodiment has a structure where polarizing elements 870 and 875 are formed on an inner surface of an lower insulating substrate 810 and on an outer surface of an upper insulating substrate 820, respectively.

Referring to FIG. 8, a polarizing element 870 is formed on an inner surface of the lower insulating substrate 810. Then, an anode electrode 820, an organic electro light emitting layer 830, a cathode electrode 840 and a transparent protection layer 850 are sequentially formed on the polarizing element 870.

Next, the anode electrode 820, the organic electro light emitting layer 830 and the cathode electrode 840 are encapsulated on the transparent protection layer 850 by using the upper insulating substrate 860.

After encapsulating with the upper insulating substrate and a sealant, a polarizing element 875 is formed on an outer surface of the upper insulating substrate 860.

As shown in FIGS 1A and 5A, when an observer looks a display device in which the lower and upper polarizing elements 170 and 175, or the polarizing elements 570 and 575 are formed, respectively, in a direction of the transparent upper insulating substrates 160 and 560, external lights 180 and 580 are disappeared while passing the lower and upper polarizing elements 170 and 175, or the polarizing elements 570 and 575. Further, internal lights 190 and 590 are linearly polarized to a direction of the upper insulating substrates 160 and 560 through the upper polarizing element 175 or the polarizing element 575. Here, internal lights 191 and 591 linearly polarized oscillate in the same direction as the polarization axis of the lower polarizing element 175 and the polarizing element 575 on the side of the upper insulating substrate 160 and 560.

Further, as shown in FIGS. 1B and 5B, when an observer looks in a direction of the transparent lower insulating substrates 110 and 510, the external lights 180 and 580 are disappeared while passing the lower and upper polarizing elements 170 and 175, or the polarizing elements 570 and 575. Further, the internal lights 190 and 590 are linearly polarized through the lower polarizing element 170 or the polarizing element 570 to a direction of the lower insulating substrates 110 and 510. Here, internal lights 192 and 592 linearly polarized

oscillate in the same direction as the polarization axis of the upper polarizing element 170 and the polarizing element 570 on the side of the lower insulating substrate 110 and 510.

Thus, an organic electro-luminescence light emitting display device having a high contrast may be implemented which can block the external light regardless of the direction in which the observer looks. Further, when the external light is reflected inside the emission element 500, the reflected external light can be blocked.

As can seen from the foregoing, according to the invention, by bonding the polarizing plates on both opposite sides of the organic electro-luminescence light emitting display device to block the external light, it is possible to realize the organic electro-luminescence light emitting display device having a high contrast. Further, in the case that it is applied to folder-type double-sided display device, the polarizing plates bonded on both surfaces of the glass substrate can not only block the external light but also function to protect the lower and upper insulating substrates, i.e. to resist a shock.

Although a preferred embodiment of the present invention has been described for illustrative purposes, it is apparent to those skilled in the art that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

What is claimed is:

1. An organic electro-luminescence light emitting display device comprising:

an anode electrode formed on a lower insulating substrate;

an organic electro light emitting layer formed on the anode electrode;

a cathode electrode formed on the organic electro light emitting layer; and

an upper insulating substrate for encapsulating the anode electrode, the an organic electro light emitting layer and the cathode electrode,

wherein polarizing elements are coated on a side surface of the upper insulating substrate and a side surface of the lower insulating substrate, respectively.

2. The organic electro-luminescence light emitting display device as claimed in claim 1, wherein the polarizing elements are coated on outer surfaces of the lower and upper insulating substrates, respectively, and are formed so that polarization axes of the polarizing elements are perpendicular to each other.

3. The electro-luminescence light emitting display device as claimed in claim 1, wherein the lower and upper layers of polarizing material are coating layers coated on the inner surfaces of the lower and upper substrates, respectively, and are disposed so that polarization axes of the lower and upper layers of polarizing material are perpendicular to each other.

4. The electro-luminescence light emitting display device as claimed in claim 1, wherein

the upper layer of polarizing material is a coating layer coated on the inner surface of the upper substrate, and the lower layer of polarizing material is a coating layer coated on the outer surface of the lower substrate, and the lower and upper layers of polarizing material are disposed so that polarization axes of the lower and upper layers of polarizing material are perpendicular to each other.

5. The electro-luminescence light emitting display device as claimed in claim 1, wherein the upper layer of polarizing material is a coating layer coated on the outer surface of the upper substrate, and the lower layer of polarizing material is a coating layer coated on the inner surface of the lower substrate, and the lower and upper layers of polarizing material are disposed so that polarization axes of the lower and upper layers of polarizing material are perpendicular to each other.

6. The electro-luminescence light emitting display device as claimed in claim 1, wherein the lower and upper layers of polarizing material each are a coating layer having a thickness from about 0.1μm to 50.0μm.

7. An electro-luminescence light emitting display device comprising:

an anode electrode formed on a lower insulating substrate;

an organic electro light emitting layer formed on the anode electrode;

a cathode electrode formed on the organic electro light emitting layer;

an upper insulating substrate for encapsulating the anode electrode, the an organic

electro light emitting layer and the cathode electrode; and

two polarizing elements arranged on one side surface of the upper insulating substrate and on one side surface of the lower insulating substrate.

8. The electro-luminescence light emitting display device as claimed in claim 7, wherein the lower and upper polarizing plates are polarizing films bonded on the inner surfaces of the lower and upper substrates, respectively, and are disposed so that polarization axes of the lower and upper polarizing plates are perpendicular to each other.

10. The electro-luminescence light emitting display device as claimed in claim 7, wherein the upper polarizing plate is a polarizing film bonded on the inner surface of the upper substrate, and the lower polarizing plate is a polarizing film bonded on the outer surface of the lower substrate, and the lower and upper polarizing plates are disposed so that polarization axes of the lower and upper polarizing plates are perpendicular to each other.

11. The electro-luminescence light emitting display device as claimed in claim 7, wherein the upper polarizing plate is a polarizing film bonded on the outer surface of the upper substrate, and the lower polarizing plate is a polarizing film bonded on the inner surface of the lower substrate, and the lower and upper polarizing plates are disposed so that polarization axes of the lower and upper polarizing plates are perpendicular to each other.

12. The electro-luminescence light emitting display device as claimed in claim 7,

wherein the lower and upper polarizing plate each are a polarizing film having a thickness from about 50μm to 300μm.

10-2003-34179

FIG. 1A

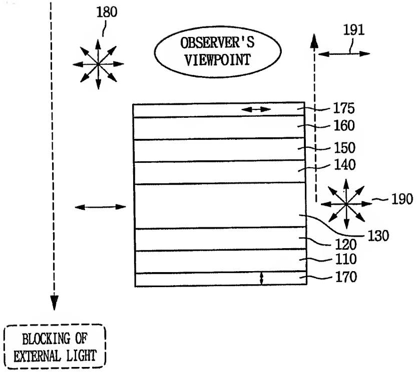


FIG. 1B

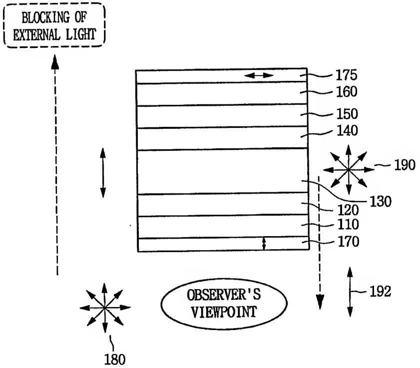


FIG. 2

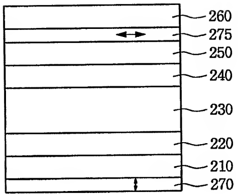


FIG. 3

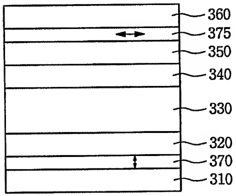


FIG. 4

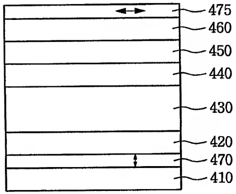
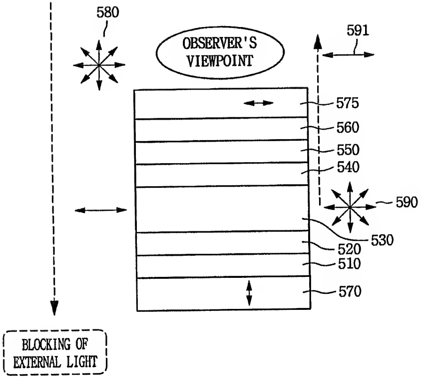
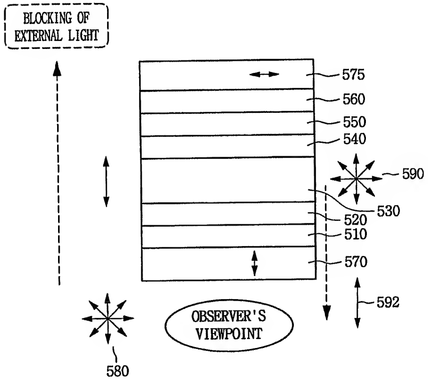


FIG. 5A



580
OBSERVER'S VIEWPOINT
591
575
560
550
540
590
530
520
510
570
BLOCKING OF EXTERNAL LIGHT

FIG. 5B



BLOCKING OF EXTERNAL LIGHT
575
560
550
540
590
530
520
510
570
592
OBSERVER'S VIEWPOINT
580

FIG. 6

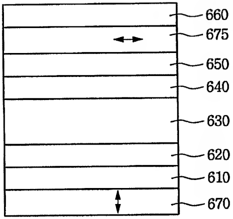


FIG. 7

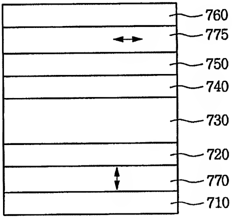
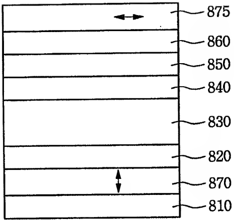


FIG. 8



Translation of Priority Document

THE KOREAN INTELLECTUAL PROPERTY OFFICE

This is to certify that annexed hereto is a true copy from the r ecords of the Korean Intellectual property Office of the following a pplication as filed

Application Number : Korean Patent Application No. 10-2003-0086116

Date of Application : November 29, 2003

Applicant(s) : Samsung SDI Co., LTD.

February 11, 2004

COMMISSIONER

[ABSTRACT]

[Abstract of the Disclosure]

The invention provides a double-sided organic light emitting device capable of increasing a definition of image quality.

A double-sided light emitting device in accordance with the invention comprises lower and upper substrates, an emission element formed between the upper substrate and the lower substrate and emitting predetermined light, an upper polarizing element disposed on surface of the upper substrate, a lower polarizing element disposed on surface of the lower substrate, an upper compensating plate disposed between the upper polarizing element and the emission element; and a lower compensating plate disposed between the lower polarizing element and the emission element. A crossing angle between a retardation axis of the lower compensating plate disposed between the lower polarizing element and the emission element and a polarization axis of the lower polarizing element has a direction opposite to a crossing angle between a retardation axis of the upper compensating plate disposed between the upper polarizing element and the emission element a polarization axis of the upper polarizing element. Thus, at a position where light emitted from the emission element is observed, light emitted from the emission element is transmitted, and all external light incident at the observed position of the light and at a position opposite to the observed position of the light are blocked, and external light reflected within the emission element is blocked.

[SPECIFICATION]

[Title of the Invention]

DOUBLE-SIDED LIGHT EMITTING DEVICE

[Brief Description of the Drawings]

FIG. 1 shows a cross-sectional structure of a double-sided organic light emitting device according to a first embodiment of the invention;

FIG. 2 shows a cross-sectional structure of a double-sided organic light emitting device according to a second embodiment of the invention;

FIG. 3 shows a cross-sectional structure of a double-sided organic light emitting device according to a third embodiment of the invention;

FIG. 4 shows a cross-sectional structure of a double-sided organic light emitting device according to a fourth embodiment of the invention;

FIG. 5A and 5B are views explaining a principle of blocking external light in the double-sided organic light emitting device of the invention.

FIG. 6 shows a cross-sectional structure of a double-sided organic light emitting device according to a fifth embodiment of the invention;

FIG. 7 shows a cross-sectional structure of a double-sided organic light emitting device according to a sixth embodiment of the invention;

FIG. 8 shows a cross-sectional structure of a double-sided organic light emitting device according to a seventh embodiment of the invention;

FIG. 9 shows a cross-sectional structure of a double-sided organic light emitting device

according to a eighth embodiment of the invention;

FIGs. 10A and 10B are views explaining a principle of blocking external light in the double-sided organic light emitting device of the invention.

[Detailed Description of the invention]

[Object of the Invention]

[Technical field of the invention and Related Art prior to the Invention]

The present invention relates to an organic light emitting display device and, more particularly, to a double-sided organic light emitting device capable of preventing a definition of image quality from being deteriorated by external light.

Flat panel displays such as organic light emitting display devices, field emission displays (FEDs) and so forth are subjected to considerable decrease in contrast according to intensity of external light. To prevent this phenomenon, for example a black matrix for blocking external light has been used. In spite of using such a black matrix, it is very difficult to completely block the external light on an emission region to make a black state.

Meanwhile, such an organic light emitting device for blocking the external light using a circular-polarizing plate is disclosed in US Patent No. 5,596,246. The conventional organic light emitting device using the circular-polarizing plate is provided with an organic electroluminescent (EL) element consisting of a transparent electrode, an organic emission layer and a reflective electrode which are formed on an insulating substrate. The insulating substrate is encapsulated with an encapsulating substrate using a sealant (not shown in the drawing), and a circular-polarizing plate consisting of a linear-polarizing plate and a $\lambda/4$ compensating plate is disposed on an outer surface of the insulating substrate.

The conventional organic light emitting device constructed as set forth above is designed so that an angle between a retardation axis of the $\lambda/4$ compensating plate and a polarization axis of the linear-polarizing plate becomes 45 degrees. Thus, the external light passes through the linear-polarizing plate to become linear-polarized light, and the linear-polarized light passes through the $\lambda/4$ compensating plate to become circular-polarized light. The circular-polarized light is reflected through the reflective electrode, and become linear-polarized light through the $\lambda/4$ compensating plate. The linear-polarized light is absorbed and blocked through the linear-polarizing plate. The conventional organic light emitting device as above-mentioned has an advantage in that it can improve the contrast by blocking the external light using the circular-polarizing plate

Meanwhile, in the double-sided organic light emitting device, light emitted by an organic light emitting layer is simultaneously emitted to directions of a substrate and an encapsulating substrate since electrodes formed on the upper and lower of the organic light emitting layer are organized to be all transmitting electrodes, Thus, it has a problem in that a view of an opposite position is transmitted so that image contrast is deteriorated.

[Technical Goal of the Invention]

It is another objective of the invention to provide a double-sided organic light emitting device capable of blocking reflected external light as well as bottom transmitted light.

It is yet another objective of the invention to provide a double-sided organic light emitting device capable of increasing a definition of image quality.

It is yet still another objective of the invention to provide a double-sided organic light emitting device capable of increasing a definition of image quality by blocking external light both at a position of seeing images and at its opposite position.

In order to accomplish these objective, according to one aspect of the present invention, there is provided a double-sided light emitting device, which comprises lower and upper substrates, an emission element formed between an inner surface of the upper substrate and an inner surface of the lower substrate and emitting predetermined light, an upper polarizing element disposed on any one of inner and outer surfaces of the upper substrate, a lower polarizing element disposed on any one of inner and outer surfaces of the lower substrate, an upper compensating plate disposed between the upper polarizing element and the emission element, and an lower compensating plate disposed between the lower polarizing element and the emission element, wherein a retardation value of each of the lower and upper compensating plates is $\lambda/4$, and each angle between the lower and upper compensating plates and the lower and upper polarizing plates is 45 degrees.

Here, a crossing angle between a retardation axis of the lower compensating plate disposed between the lower polarizing element and the emission element and a polarization axis of the lower polarizing element has a direction opposite to a crossing angle between a retardation axis of the upper compensating plate disposed between the upper polarizing element and the emission element a polarization axis of the upper polarizing element.

The lower polarizing element is disposed on the outer surface of the lower substrate, and the lower compensating plate is disposed between the lower polarizing element and the outer surface of the lower substrate, and the upper polarizing element is disposed on the outer surface

of the upper substrate, and the upper compensating plate is disposed between the upper polarizing element and the outer surface of the upper substrate. Otherwise, the lower polarizing element is disposed on the outer surface of the lower substrate, and the lower compensating plate is disposed between the lower polarizing element and the outer surface of the lower substrate, and the upper polarizing element is disposed on the inner surface of the upper substrate, and the upper compensating plate is disposed between the upper polarizing element and the inner surface of the upper substrate.

Alternatively, the lower polarizing element may be disposed on the inner surface of the lower substrate, and the lower compensating plate may be disposed between the lower polarizing element and the inner surface of the lower substrate, and the upper polarizing element may be disposed on the inner surface of the upper substrate, and the upper compensating plate may be disposed between the upper polarizing element and the inner surface of the upper substrate. Otherwise, the lower polarizing element may be disposed on the inner surface of the lower substrate, and the lower compensating plate may be disposed between the lower polarizing element and the inner surface of the lower substrate, and the upper polarizing element may be disposed on the outer surface of the upper substrate, and the upper compensating plate may be disposed between the upper polarizing element and the outer surface of the upper substrate.

Furthermore, the lower and upper compensating plates include at least one compensating film having a predetermined phase difference retardation axis. When a phase difference retardation axis of each of the lower and upper compensating plates is $\lambda/4$ and angles between retardation axes of the lower and upper compensating plates and polarization axes of the lower and upper polarizing elements are opposite to each other, external light which is incident

and transmitted from a position opposite to an observing position of light emitted from the emission element is no longer transmitted toward an observer regardless of not only an angle between polarization axis of the upper polarizing element and the phase difference retardation axes of the lower and upper compensating plates but also an angle between polarization axis of the lower polarizing element and the phase difference retardation axes of the lower and upper compensating plates.

According to another aspect of the present invention, there is provided a double-sided light emitting device, which comprises lower and upper substrates, an emission element formed between an inner surface of the upper substrate and an inner surface of the lower substrate and emitting predetermined light, an upper polarizing element disposed on any one of inner and outer surfaces of the upper substrate, a lower polarizing element disposed on any one of inner and outer surfaces of the lower substrate, and an upper compensating plate disposed between the upper polarizing element and the emission element, and a lower compensating plate disposed between the lower polarizing element and the emission element, wherein angle between phase difference retardation axis of the lower compensating plate and polarization axis of the lower polarizing element and angle between phase difference retardation axis of the upper compensating plate and polarization axis of the upper polarizing element are opposite to each other, and wherein at a position where light emitted from the emission element is observed, light emitted from the emission element is transmitted, and all external light incident at the observed position of the light and at a position opposite to the observed position of the light are blocked, and external light reflected within the emission element is blocked.

[Structure and Operation of the Invention]

The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This invention may, however, be embodied in different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. In the drawings, the lengths, the thickness, etc. of layers and regions are exaggerated for clarity. Like numbers refer to like elements throughout the specification.

FIG. 1 shows a cross-sectional structure of a double-sided organic light emitting device according to a first embodiment of the invention.

Referring to FIG. 1, there is an insulating substrate as a lower substrate 110, on which an anode electrode 120 is formed. An organic thin layer 130 is formed on the anode electrode 120. A cathode electrode 140 is formed on the organic thin layer 130. An encapsulating substrate 150 is bonded and encapsulated to the lower substrate 110 using a sealant(not shown).

The lower and upper substrates 110 may make use of a transparent substrate such as a glass substrate. The anode electrode 120 is a transparent electrode, which is formed by depositing and patterning transparent conductive layer of ITO (Indium Tin Oxide), IZO (Indium Zinc Oxide) or so forth on an inner surface of the lower substrate 110. The organic thin layer 130 includes at least one of a hole injecting layer (HIL), a hole transporting layer (HTL), an emission layer, a hole blocking layer (HBL), an electron transporting layer (ETL) and an electron injecting layer (EIL). The cathode electrode 140 is also a transparent electrode, which is

formed by depositing a metal layer of Ca, LiF or so forth which has a low work function.

Upper and lower circular-polarizing elements 180 and 170 are arranged on outer surfaces of the lower substrate 110 and the encapsulating substrate 150, respectively. The lower and upper circular-polarizing elements 170 and 180 include a linear-polarizing plate 175 and 185 and a compensating plate 171 and 181. The compensating plate 171 and 181 make use of $\lambda/4$ compensating plate, respectively.

In the first embodiment, the lower and upper polarizing elements 185 and 175 are disposed on on the outer surfaces of the lower substrate 110 and the encapsulating substrate 150. The lower compensating plate 171 is disposed between the outer surface of the lower substrate 110 and the organic thin layer 130, and the upper compensating plate 181 is disposed between the outer surface of the encapsulating substrate 150 and the organic thin layer 130.

Alternatively, in the other exemplary embodiments, in the case that the lower and upper polarizing elements 185 and 175 are formed of polarizing film or by coating polarizing material, the lower and upper polarizing elements 185 and 175 are disposed on inner surfaces of the lower substrate 110 and the encapsulating substrate 150. Further, the lower compensating plate 171 is disposed between the inner surface of the lower substrate 110 and the organic thin layer 130, and the upper compensating plate 181 is disposed between the inner surface of the encapsulating substrate 150 and the organic thin layer 130.

Meanwhile, in other exemplary embodiments, one of the lower and upper polarizing elements 185 and 175 is disposed on an inner surface of one of the lower substrate 110 and the encapsulating substrate 150, and the other is disposed on an outer surface of the other substrate.

Further, the lower and upper compensating plates 171 and 181 are disposed between the inner and outer surfaces of the lower substrate 110 and the organic thin layer 130, respectively.

In the double-sided organic light emitting device having a configuration as set forth above, when each phase difference retardation value, of the lower and upper compensating plates 171 and 181 is denoted by x, the phase difference retardation value, x, satisfies the following expression.

$n\lambda/2 \leq x \leq (n+1)\lambda/2$, where n is the integer number.

Thus, the double-sided organic light emitting device of the present invention can block the external light regardless of the direction in which the observer looks. Further, when the external light is reflected inside the emission element 500, the reflected external light can be blocked. Thus, the double-sided organic light emitting device of the present invention has a high contrast.

In the double-sided organic light emitting device according to the first embodiment of the invention, a principle of blocking external light will be described below with reference to FIGS. 5A and 5B.

When an observer 160 looks on the side of the encapsulating substrate 160 as the upper substrate, light emitted from the EL layer 130 is observed through a circular-polarizing plate 180. An external light 195 transmitted from the observer 160 to an encapsulating substrate travels in an arrow direction 196 after being circularly polarized through a linear polarizing plate 185 of an upper circular-polarizing plate 180 and an upper compensating plate 181.

As such, the light circularly polarized through the circular-polarizing plate 180 is reflected by a layer structure of an EL device 100 and the reflected external light is polarized in a different direction. Here, the so that the observer 160 sees the light through the upper substrate 160. The light circularly polarized in a direction of left polarization is changed to the light circularly polarized in a direction of right polarization. Thus, the light circularly polarized changed in the polarization position is changed to a linear polarization light by the upper compensation plate 181. Thus, the external light linearly polarized through in a different direction to cross 90 degrees with an incident angle of the light which is incident through the encapsulating substrate 150, thus failing in transmission.

Further, in the case of another external light which is incident at a position opposite to the observer 160, namely, transmitted external light which is incident on and transmitted through the insulating substrate 110, when a phase difference retardation axis of each of the upper and lower compensating plates 181 and 171 is $\lambda/4$ and angles between retardation axes of the upper and lower compensating plates 181 and 171 and polarization axes of the lower and upper polarizing elements 175 and 185 are opposite to each other, external light transmitted through the insulating substrate 110 is no longer transmitted toward an observer 160 regardless of not only an angle between polarization axis of the upper polarizing element 185 and the phase difference retardation axes of the lower and upper compensating plates 171 and 181 but also an angle between polarization axis of the lower polarizing element 181 and the phase difference retardation axes of the lower and upper compensating plates 181 and 171.

For example, as illustrated in FIG. 5A, when the linear-polarizing plate 185 of the upper

circular-polarizing plate 180 and the linear-polarizing plate 175 of the lower circular-polarizing plate 170 are arranged so that their polarization axes are parallel to each other, the transmitted external light 196 incident on and transmitted through the insulating substrate 110 is circularly polarized through the linear-polarizing plate 175 and the compensating plate 171 which constitute the lower circular-polarizing plate 170, and then travels toward the encapsulating substrate 150.

In this case, because the phase difference delay axes of the lower and upper compensating plates 171 and 181 are equal to each other, the transmitted external light is shifted twice by λ/4 in the same direction, consequently by a total of λ/2, and is transformed into linearly polarized light. In the case of the transmitted external light, its polarization axis after it is linearly polarized is perpendicular to its polarization axis before it is linearly polarized, i.e., when it is incident on the insulating substrate 110. As a result, the transmitted external light passing through the insulating substrate 110 at the position opposite to the observer 160 is blocked without being emitted through the upper circular-polarizing plate 180.

As in FIG. 5B, even when the linear-polarizing plate 185 of the upper circular-polarizing plate 180 and the linear-polarizing plate 175 of the lower circular-polarizing plate 170 are arranged so that their polarization axes are perpendicular to each other, external light which is incident through the encapsulating substrate 150 and is reflected through the EL element 100, i.e., reflected external light is blocked as well according to the same principle as in FIG. 5A.

Further, the external light which is incident on the side of the insulating substrate 110 to pass through the insulating substrate 110, i.e., the transmitted external light is circularly polarized

through the linear-polarizing plate 175 and the compensating plate 171 which constitute the lower circular-polarizing plate 170, and then travels toward the encapsulating substrate 150. In this case, because the phase difference retardation axes of the lower and upper compensating plates 171 and 181 are perpendicular to each other, the transmitted incident light is linearly polarized in the same direction as the direction when passing through the insulating substrate 110, the upper linear-polarizing plate 185 on the side of the encapsulating substrate is perpendicular to the lower linear-polarizing plate 175, so that the transmitted external light passing through the insulating substrate 110 is blocked without being emitted toward the observer 160 through the upper circular-polarizing plate 180.

Here, the reflected external light refers to light which is incident on the encapsulating substrate 150 to travel toward the insulating substrate 110 and is reflected through the internal EL element 100 to travel toward the encapsulating substrate 150 again, or which is incident on the insulating substrate 110 to travel toward the encapsulating substrate 150 and is reflected through the internal EL element 100 to travel toward the insulating substrate 510 again. Further, the transmitted external light refers to light which is incident through the encapsulating substrate 150 to travel toward the insulating substrate 110, or which is incident through the insulating substrate 110 to travel toward the encapsulating substrate 150.

As a result, only the light 190 emitted from the emission layer 130 is seen to the observer 160, but the external light incident on the side of the encapsulating substrate is blocked. Therefore, although the light is emitted from the emission layer 130 in both opposite directions, a background on the side of the insulating substrate is not projected, so that the observer 160 can recognize only the light emitted from the emission layer 130. This allows a definition of image

quality to be improved.

For this reason, in the double-sided organic light emitting device of the invention, with regard to the transmitted external light which is incident from the direction opposite to the observer 160, it is preferable that the crossing angles between the retardation axes of the lower and upper compensating plates 171 and 181 and the polarization axes of the lower and upper linear-polarizing plates 175 and 185 become rotational angles opposite to each other at the lower and upper substrates.

FIG. 2 shows a cross-sectional structure of a double-sided organic light emitting device according to a second embodiment of the invention.

Referring to FIG. 2, the double-sided organic light emitting device of the second embodiment is similar to that of the first embodiment except for a compensating plate. Specifically, the compensating plate is configured of one λ/4 compensating plate in the first embodiment, but a plurality of compensating films in the second embodiment, each of which has a phase difference retardation axis and functions as the λ/4 compensating plate.

In the double-sided organic light emitting device according to the second embodiment, there is a lower insulating substrate 210, on which a lower electrode 220 is formed. An organic thin layer 230 and an upper electrode 240 are formed on the lower electrode 220. An encapsulating substrate 250 is bonded and encapsulated to the lower substrate 210 using a sealant. Lower and upper circular-polarizing plates 270 and 280 are disposed on outer surfaces of the lower and encapsulating substrates 210 and 250, respectively. The lower circular-polarizing plate 270 includes a lower linear-polarizing plate 275 and a lower compensating plate 271. The

lower compensating plate 271 makes use of the λ/4 compensating plate. Similarly, the upper circular-polarizing plate 280 includes an upper linear-polarizing plate 285 and an upper compensating plate 281. The upper compensating plate 281 makes use of the plurality of compensating films 282-284 so as to function as the λ/4 compensating plate. Here, the compensating films 282 through 284 have their phase difference retardation axes which are equal to or different from each other.

FIG. 3 shows a cross-sectional structure of a double-sided organic light emitting device according to a third embodiment of the invention.

Referring to FIG. 3, the double-sided organic light emitting device of the third embodiment is similar to that of the first embodiment except for a compensating plate 171 of the lower circular-polarizing plate 170. Specifically, the compensating plate 171 is configured of one λ/4 compensating plate in the first embodiment, but a plurality of compensating films 372 through 374 in the third embodiment, each of which has a phase difference retardation axis and functions as the λ/4 compensating plate.

FIG. 4 shows a cross-sectional structure of a double-sided organic light emitting device according to a fourth embodiment of the invention.

Referring to FIG. 4, the double-sided organic light emitting device of the fourth embodiment is similar to that of the first embodiment except for compensating plates 171 and 181 of the lower and upper circular-polarizing plates 170 and 180. Specifically, each of the compensating plates 171 and 181 is configured of one λ/4 compensating plate in the first embodiment, but the plurality of compensating films 472 through 474; and 482 through 484 in

the fourth embodiment, each of which has a phase difference retardation axis and functions as the $\lambda/4$ compensating plate.

In the double-sided organic light emitting devices according to the second to fourth embodiments shown in FIGS. 2 through 4, as in the first embodiment, when each phase difference retardation value, of the lower and upper compensating plates 471 and 481 is denoted by x, each phase difference retardation value x satisfies the following expression.

$n\lambda/2 \leq x \leq (n+1)\lambda/2$, where n is the integer number.

Thus, as in the first embodiment, both transmitted external light and reflected external light are blocked based on the principle as shown in FIGS. 5A and 5B, so that it is possible to improve a definition of image quality.

FIG. 6 shows a cross-sectional structure of a double-sided organic light emitting device according to a fifth embodiment of the invention.

Referring to FIG. 6, the double-sided organic light emitting device of the fifth embodiment is similar to that of the first embodiment, but is applicable in the case that it is intended to improve effects of blocking light on the side of the encapsulating substrate rather than the lower substrate by providing the circular-polarizing plate only on the side of the encapsulating substrate.

In the double-sided organic light emitting device according to the fifth embodiment, there is a lower insulating substrate 510, on which a lower electrode 520 is formed. An organic thin layer 530 and an upper electrode 540 are formed on the lower electrode 520. An

encapsulating substrate 550 is bonded and encapsulated to the lower substrate 510 using a sealant. Upper circular-polarizing plate 580 is disposed on outer surfaces of the encapsulating substrate 550, and lower linear-polarizing plate 576 is disposed on outer surfaces of the lower substrate 510. The circular-polarizing plate 580 includes a linear-polarizing plate 585 and a compensating plate 581. The compensating plate 581 makes use of the λ/4 compensating plate.

In the fifth embodiment shown in FIG. 6, as shown in FIGS. 10A and 10B, it is possible to accomplish effects of blocking not only external light incident only at a position of an observer 560, i.e. on the side of the encapsulating substrate but also reflected light of this external light.

FIG. 7 shows a cross-sectional structure of a double-sided organic light emitting device according to a sixth embodiment of the invention.

Referring to FIG. 7, the double-sided organic light emitting device of the sixth embodiment is similar to that of the fifth embodiment, but is different in that it is intended to improve effects of blocking light on the side of the lower substrate rather than the encapsulating substrate by providing the circular-polarizing plate only on the side of the lower substrate. A lower circular-polarizing plate 670 is configured of a linear-polarizing plate 675 and a compensating plate 671. The compensating plate 671 makes use of the λ/4 compensating plate.

FIG. 8 shows a cross-sectional structure of a double-sided organic light emitting device according to a seventh embodiment of the invention.

Referring to FIG. 8, the double-sided organic light emitting device of the fifth embodiment is similar to that of the fourteenth embodiment except that a compensating plate 781

of an upper circular-polarizing plate 780 is configured using a plurality of compensating films 782 through 784, each of which has a phase difference retardation axis.

FIG. 9 shows a cross-sectional structure of a double-sided organic light emitting device according to a eighth embodiment of the invention.

Referring to FIG. 9, the double-sided organic light emitting device of the eighth embodiment is similar to that of the sixth embodiment except that a compensating plate 871 of a lower circular-polarizing plate 870 is configured using a plurality of compensating films 872 through 874, each of which has a phase difference retardation axis.

As can seen from the foregoing, according to the invention, by bonding the polarizing plates on both opposite sides of the double-sided organic light emitting device to block the external light, it is possible to realize the double-sided organic light emitting device having a high contrast. Further, in the case that it is applied to folder-type double-sided display device, the polarizing plates bonded on both surfaces of the glass substrate can not only block the external light but also function to protect the lower and upper insulating substrates, i.e. to resist a shock.

Although a preferred embodiment of the present invention has been described for illustrative purposes, it is apparent to those skilled in the art that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

What is claimed is

1. An organic light emitting display comprising a substrate, a first electrode formed on the substrate, a second electrode formed on the first electrode, and an organic functional layer which is interposed between the first electrode and the second electrode and which has at least an emission layer,

wherein at least one of the first electrode and the second electrode is a transparent electrode, and

wherein red, green, blue, cyan, magenta, and yellow color modulation layers separated from each other are formed on a surface opposite to the surface of the transparent electrode adjacent to the emission layer.

2. The organic light emitting display according to claim 1, wherein the color modulation layers are formed using a laser thermal transfer method.

3. The organic light emitting display according to claim 1, wherein the color modulation layers are color filter layers.

4. The organic light emitting display according to claim 1, wherein the color modulation layers have a stacked structure of a color filter layer and a color conversion layer.

5. The organic light emitting display according to claim 1, wherein the emission layer is a white light-emitting layer.

6. The organic light emitting display according to claim 5, wherein the emission layer has two or more sub emission layers.

7. The organic light emitting display according to claim 6, wherein one sub emission layer of the sub emission layers is an emission layer emitting light of an orange-red

range, and the other sub emission layer is an emission layer emitting light of a blue range.

8. The organic light emitting display according to claim 7, wherein the emission layer emitting the light of an orange-red range is a phosphorescent emission layer and the emission layer emitting the light of a blue range is a fluorescent emission layer.

9. The organic light emitting display according to claim 1, wherein the organic functional layer further includes a charge injection layer and/or a charge transport layer.

10. The organic light emitting display according to claim 1, further comprising a thin film transistor which is disposed between the substrate and the first electrode and which is electrically connected to the first electrode.

11. The organic light emitting display according to claim 1, wherein when the first electrode is a transparent electrode, the second electrode is a reflective electrode, and

wherein the color modulation layer is disposed between the substrate and the first electrode.

12. The organic light emitting display according to claim 11, further comprising an over-coating layer interposed between the color modulation layer and the first electrode.

13. The organic light emitting display according to claim 11, wherein the substrate has a light-shielding area and a light-transmitting area,

wherein an active layer which is disposed in the light-shielding area and has a source region, a drain region, and a channel region and; a gate insulating layer disposed on the active layer; a gate electrode which is disposed on the gate insulating layer and overlaps the channel region; a first insulating interlayer which is disposed on the light-shielding area including the gate electrode and the light-transmitting area; a source electrode and a drain electrode which passes through the first insulating interlayer and contacts the source region and

the drain region, respectively; and a second insulating interlayer which is disposed on the light-shielding area including the source electrode and the drain electrode and the light-transmitting area and has via holes for exposing the source electrode and the drain electrode, are provided,

wherein the first electrode is disposed on the second insulating interlayer in the light-transmitting area and is connected to the source electrode and the drain electrode exposed through the via holes, and

wherein the color modulation layer is disposed between the substrate and the first electrode in the light-transmitting area.

14. The organic light emitting display according to claim 13, wherein the color modulation layer is disposed between the second insulating interlayer and the first electrode and an over-coating layer is further disposed between the color modulation layer and the first electrode.

15. The organic light emitting display according to claim 1, wherein when the second electrode is a transparent electrode, the first electrode is a reflective electrode, and

wherein the color modulation layer is disposed on the second electrode.

16. The organic light emitting display according to claim 15, further comprising a transparent passivation layer disposed between the color modulation layer and the second electrode.

17. The organic light emitting display according to claim 16, wherein the transparent passivation layer is one of an inorganic layer, an organic layer, and an inorganic-organic compound layer.

18. The organic light emitting display according to claim 15, further comprising an over-coating layer disposed on the color modulation layer.

19. The organic light emitting display according to claim 1, wherein when the first electrode and the second electrode are both a transparent electrode, the color modulation layer has a first color modulation layer disposed between the substrate and the first electrode and a second color modulation layer disposed on the first color modulation layer and the second electrode.

20. The organic light emitting display according to claim 19, further comprising an over-coating layer disposed between the first color modulation layer and the first electrode.

21. The organic light emitting display according to claim 19, further comprising a transparent passivation layer disposed between the second electrode and the second color modulation layer.

22. The organic light emitting display according to claim 19, further comprising an over-coating layer disposed on the second color modulation layer.

23. The organic light emitting display according to claim 19, wherein the substrate has a light-shielding area and a light-transmitting area,

wherein an active layer which is disposed in the light-shielding area and has a source region, a drain region, and a channel region and; a gate insulating layer disposed on the active layer; a gate electrode which is disposed on the gate insulating layer and overlaps the channel region; a first insulating interlayer which is disposed on the light-shielding area including the gate electrode and the light-transmitting area; a source electrode and a drain electrode which passes through the first insulating interlayer and contacts the source region and the drain region, respectively; and a second insulating interlayer which is disposed on the light-shielding area including the source electrode and the drain electrode and the light-transmitting area and has via holes for exposing the source electrode and the drain electrode, are provided,

wherein the first electrode is disposed on the second insulating interlayer in the light-transmitting area and is connected to the source electrode or the drain electrode exposed

through the via holes, and

wherein the first color modulation layer is disposed between the substrate and the first electrode in the light-transmitting area.

24. The organic light emitting display according to claim 23, wherein the first color modulation layer is disposed between the second insulating interlayer and the first electrode and an over-coating layer is further provided between the first color modulation layer and the first electrode.

10-2003-86116

FIG. 1

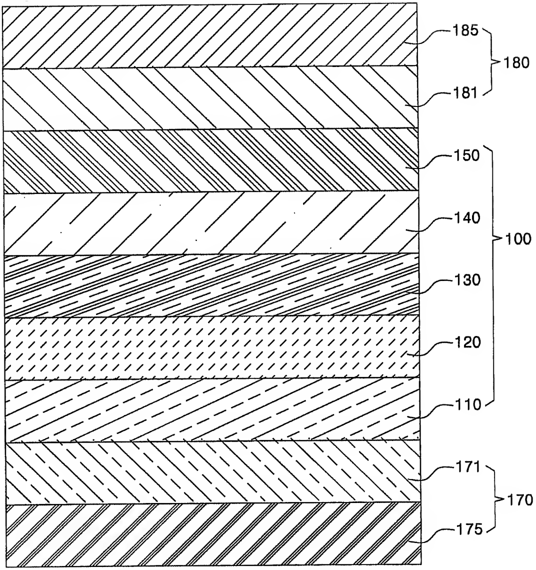


FIG. 2

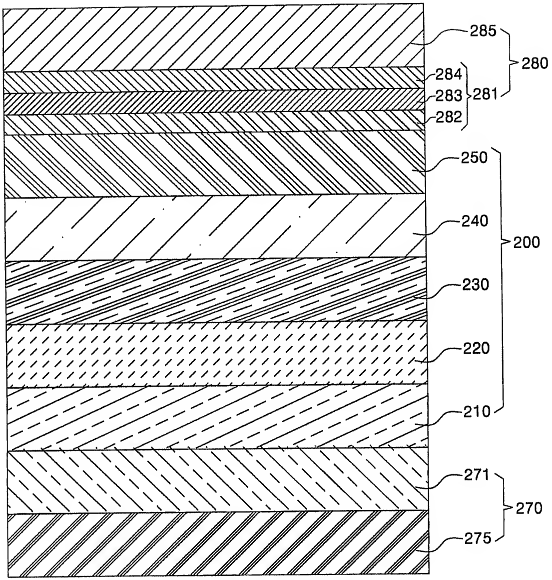


FIG. 3

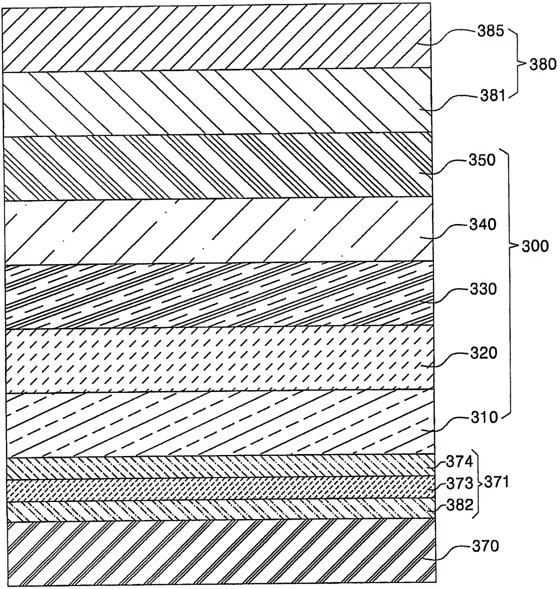


FIG. 4

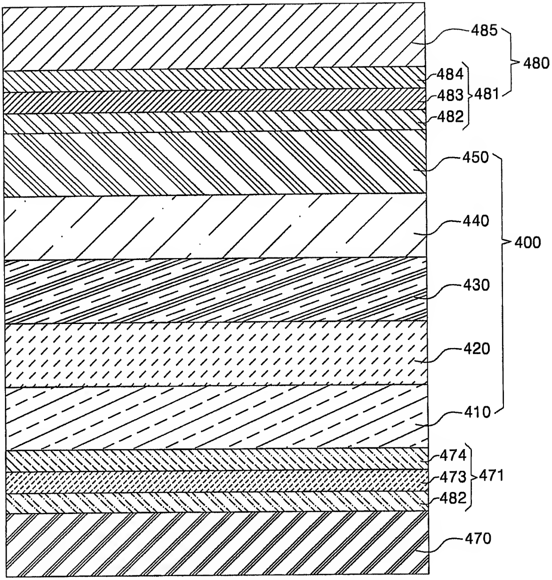


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FIG. 5A

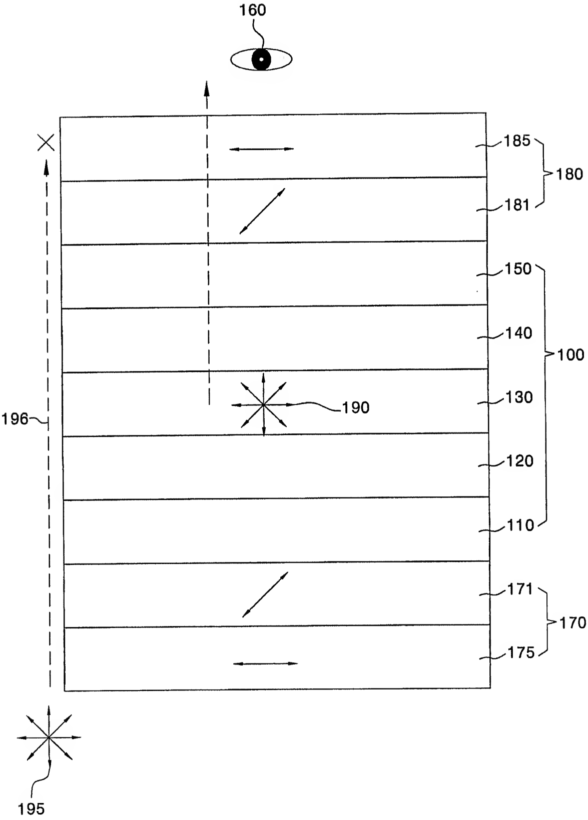

FIG. 5B

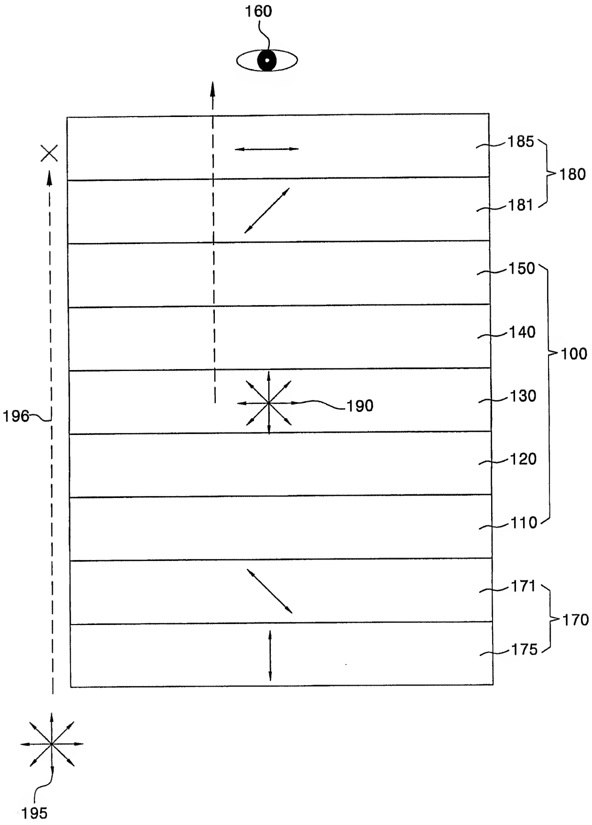

FIG. 6

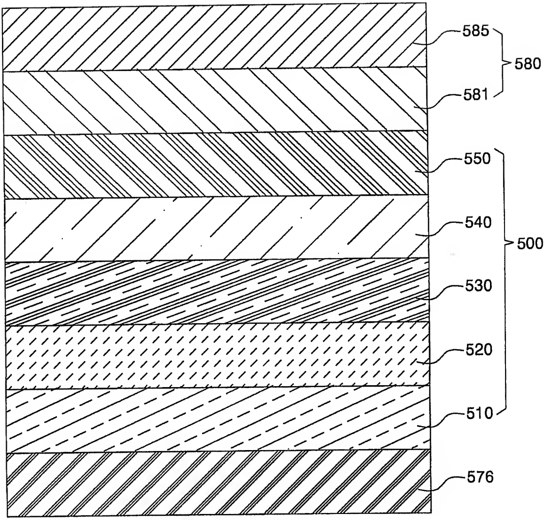

FIG. 7

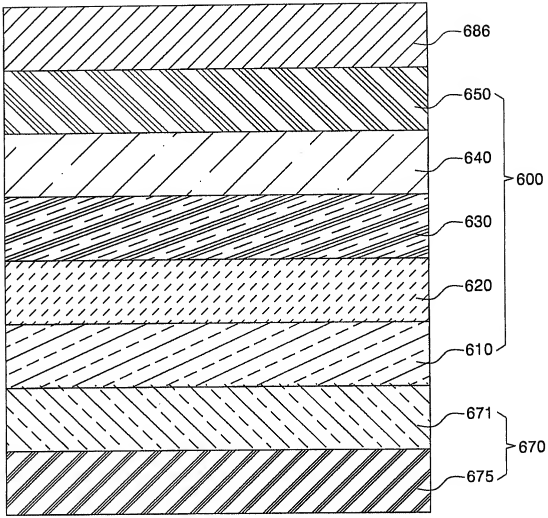

FIG. 8

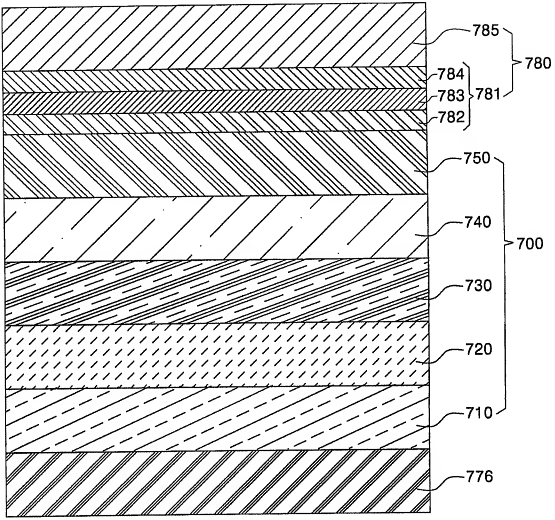

FIG. 8

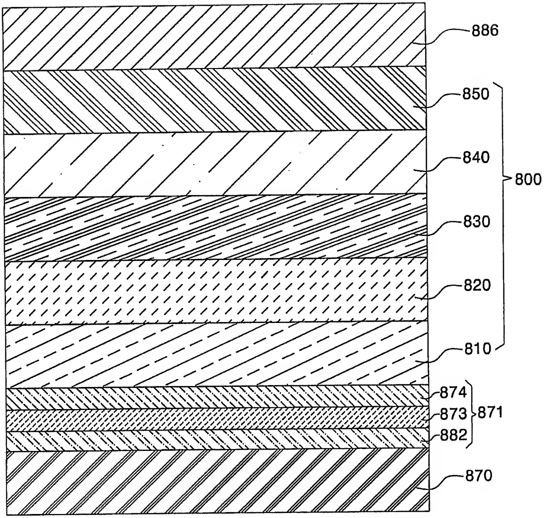

FIG. 9

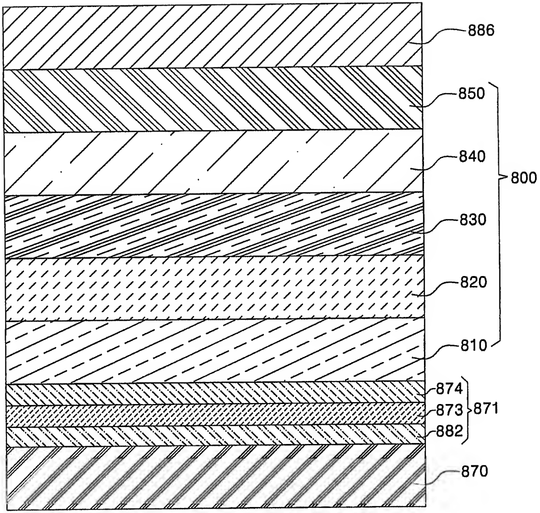

FIG. 10A

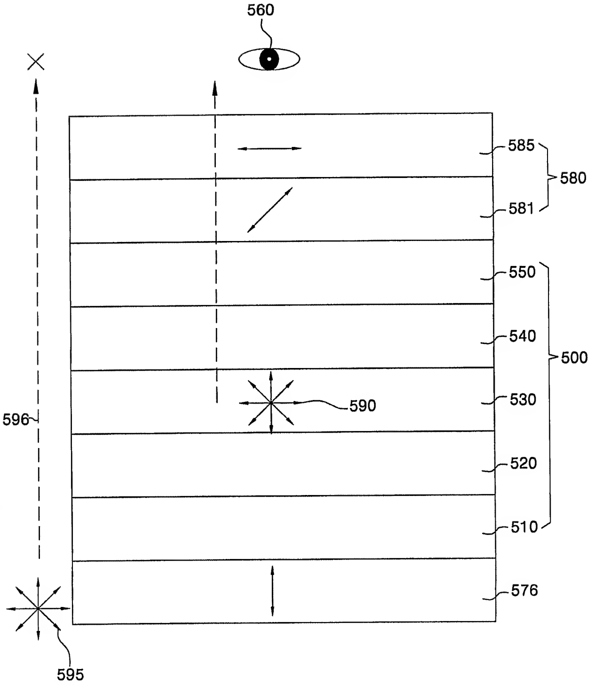

FIG. 10B